

Assessing Links Between Ecosystem Health and Childhood Asthma

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In collaboration with

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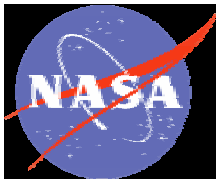


Pilot Project Accomplishments

1.Design and development of tools for:

- integrating, visualizing, accessing, and analyzing
 - environmental, remotely sensed, and clinical health data
- providing information for public health decision support systems
 - appropriate medical regimen
 - when to take action to avoid exposure
 - where to target intervention and education
 - policy for long term changes



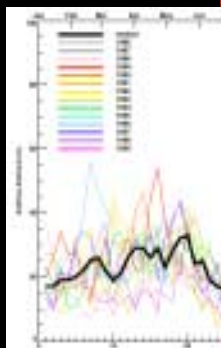


Design of Tools and Capabilities

1. Data Base Development



Formatting,
encapsulation

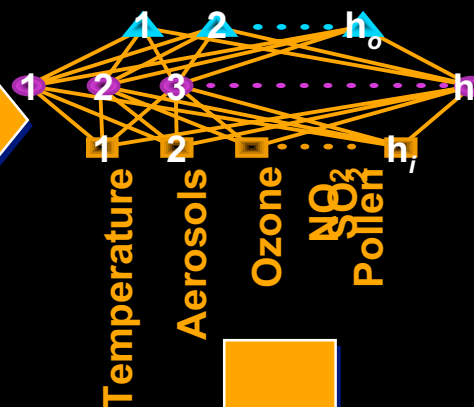


2. GIS and Visualization



Manipulation,
output

3. Modeling



4. Access to Knowledge





Data Base Components

Clinical data: HSCRC (hospitalizations and emergency room admissions with daily time step, zip code spatial level, age, gender, race), Medicaid, others

Socio-Economic: US census data, school data

Weather: precipitation, wind speed and direction, temperature, humidity, etc.

Air Quality: O_3 , NO_2 , CO , SO_2 , air toxins, precursors to ozone, etc.

Water Quality: pharmaceuticals, pesticides, and other compounds

Environmental: pollen, molds, brownfields, soil properties, topography, ecoregions, agricultural activity, etc.

Remote Sensing: Landsat, AVHRR, Ikonos, SPOT, Aeronet, MODIS, ASTER, etc.

Landmark features: roads, cities, traffic, major industrial areas, etc.



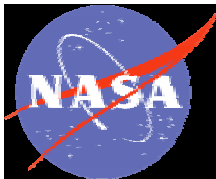


Pilot Project Accomplishments (cont.)

2. Journal articles (5) and presentations reporting on:

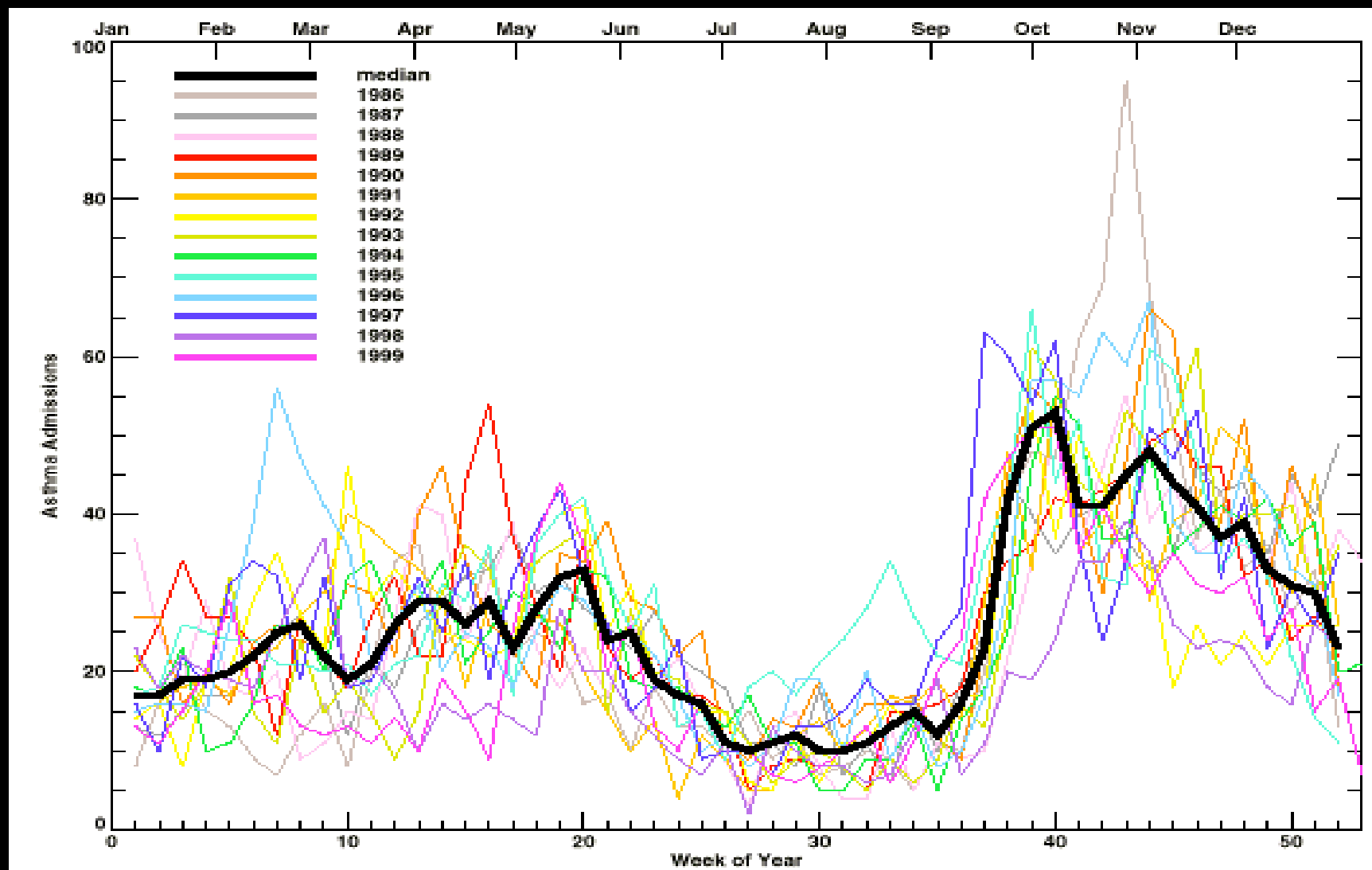
- Geographic and temporal distribution of pediatric asthma
- Detection and prediction of epidemics
- Identification of sensitive populations
- Preliminary analysis of effects of environmental factors on asthma incidence
- Other information



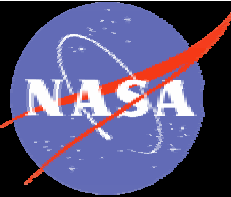


Temporal Data Application

Pediatric Asthma Hospital Admissions, 1986-1999, Baltimore, MD



Blaisdell et al. Journal of Asthma, 2002; Kimes et al., Environmental Research, 2003



Temporal Data Application

Daily Ozone and Pediatric Hospital Admissions, 1999

Select a category and a location in the database with the menus and then choose one or more variables. 2) Set start/end dates and push 'Select'. Push 'Help' to understand how the category and location menus interact. 3) Push 'Write File'.

Records chosen: Total: 365 records selected.

.....Database Categories to Select.....

category	Ozone: 97-99	location	Lvclrm	Off
<input type="checkbox"/> 0hr	<input type="checkbox"/> 1hr	<input type="checkbox"/> 2hr	<input type="checkbox"/> 3hr	
<input type="checkbox"/> 4hr	<input type="checkbox"/> 5hr	<input type="checkbox"/> 6hr	<input type="checkbox"/> 7hr	
<input type="checkbox"/> 8hr	<input type="checkbox"/> 9hr	<input type="checkbox"/> 10hr	<input type="checkbox"/> 11hr	
<input type="checkbox"/> 12hr	<input type="checkbox"/> 13hr	<input type="checkbox"/> 14hr	<input type="checkbox"/> 15hr	
<input type="checkbox"/> 16hr	<input type="checkbox"/> 17hr	<input type="checkbox"/> 18hr	<input type="checkbox"/> 19hr	
<input type="checkbox"/> 20hr	<input type="checkbox"/> 21hr	<input type="checkbox"/> 22hr	<input type="checkbox"/> 23hr	
<input type="checkbox"/> Min	<input type="checkbox"/> Max	<input type="checkbox"/> Mean	<input type="checkbox"/> Median	

.....Choose Time range (& optional month/day).....

start date: Jan 1, 1999 (from Jan 1, 1997) end date: Dec 31, 1999 (to Dec 31, 1999)

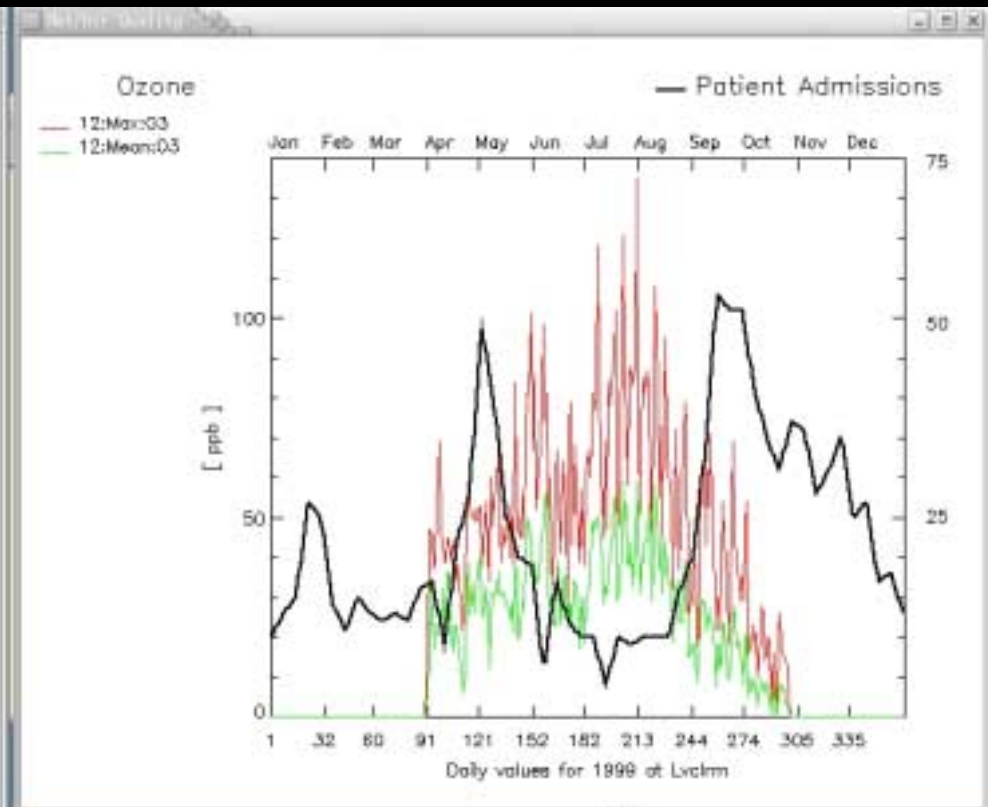
month(s): All day(s): All

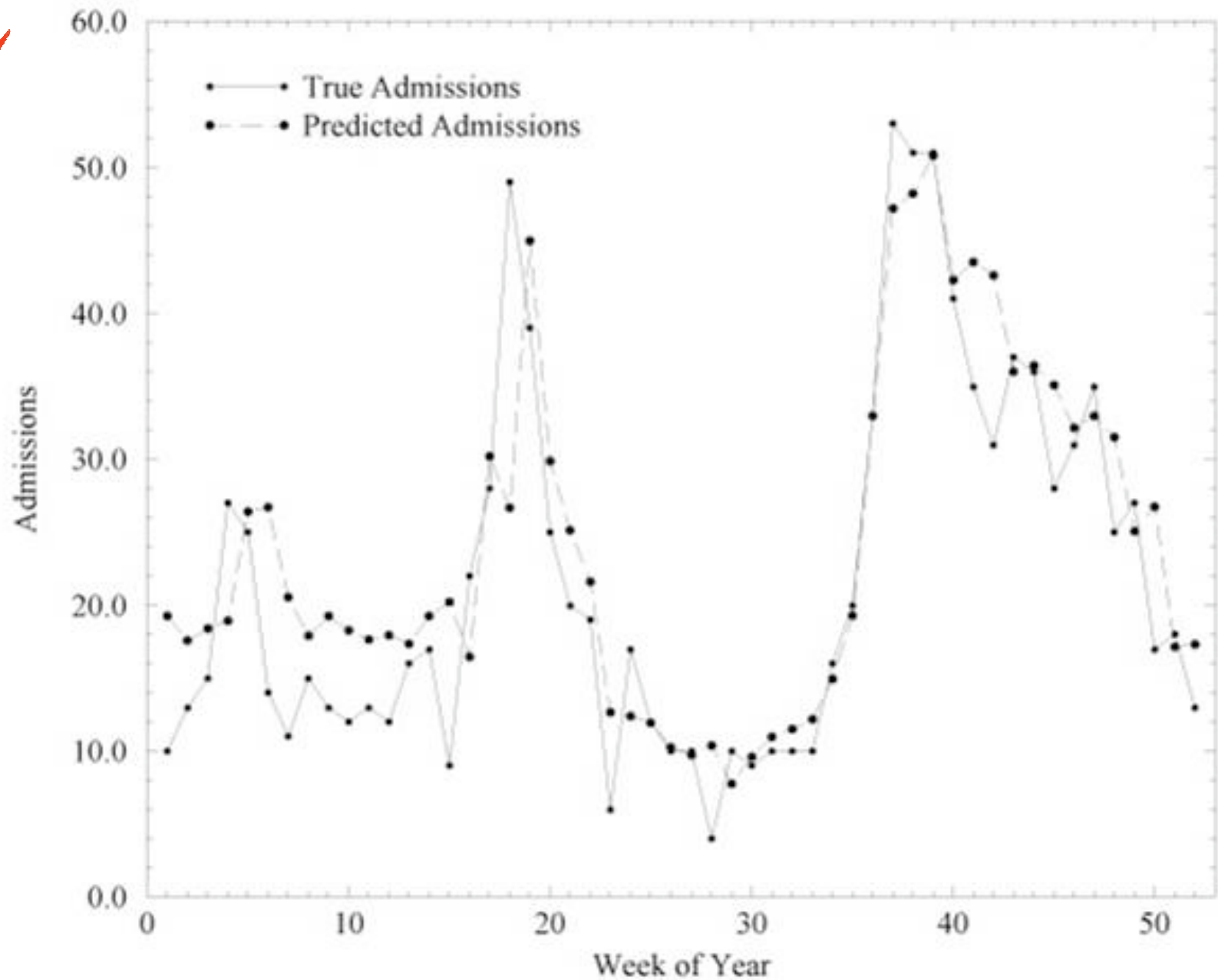
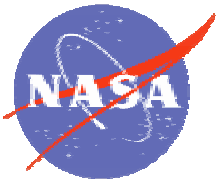
.....Output options.....

Summing: None delimiter: blanks

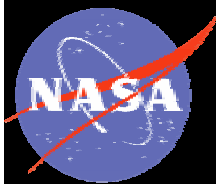
file name: db2.txt

Select Write File Print Close Help

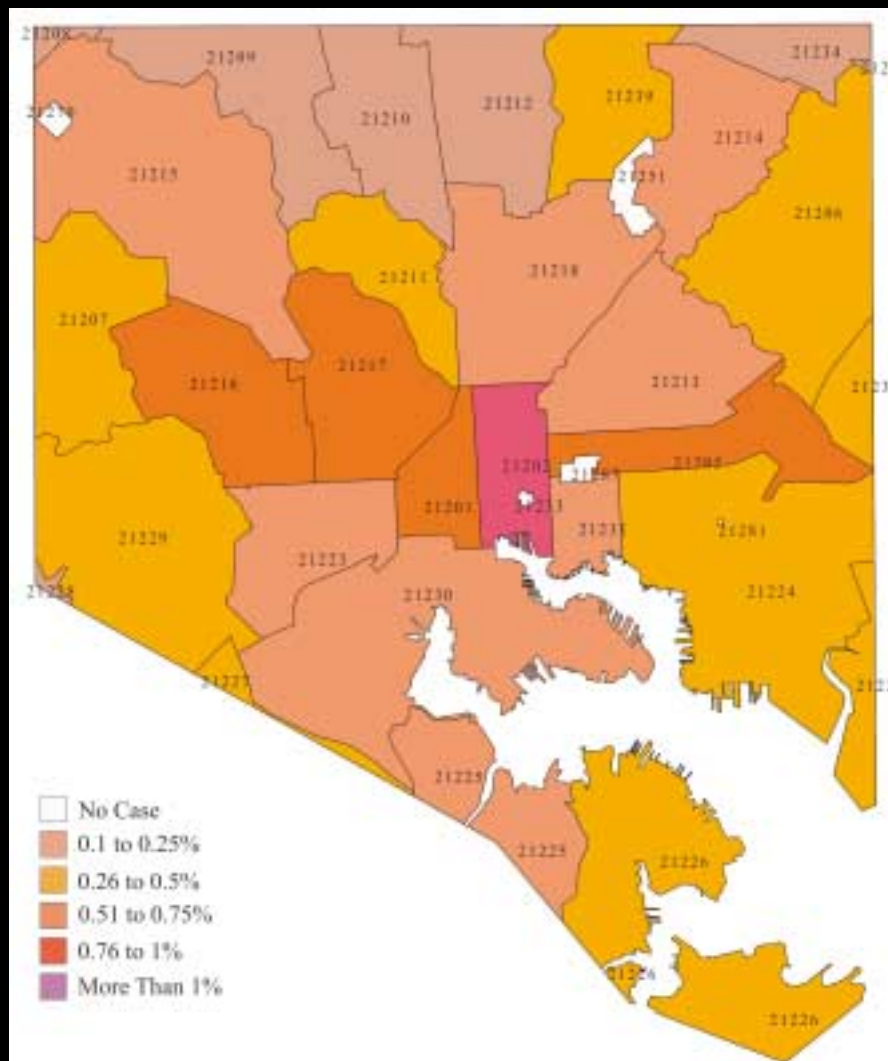




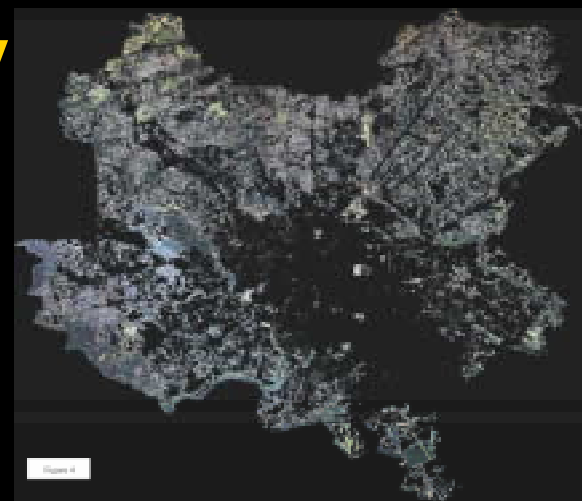
Blaisdell et al. J. of Asthma, 2002; Kimes et al., Int. J. Neural Network Appl, 2003



% Pediatric Hospitalization Rates by Zip Code, Baltimore, MD, 1999



$R^2=.95$



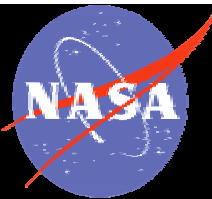
From Landsat:

- Highest proportion of built areas
- Lowest vegetation cover
- Highest thermal IR radiant temperatures

From Census:

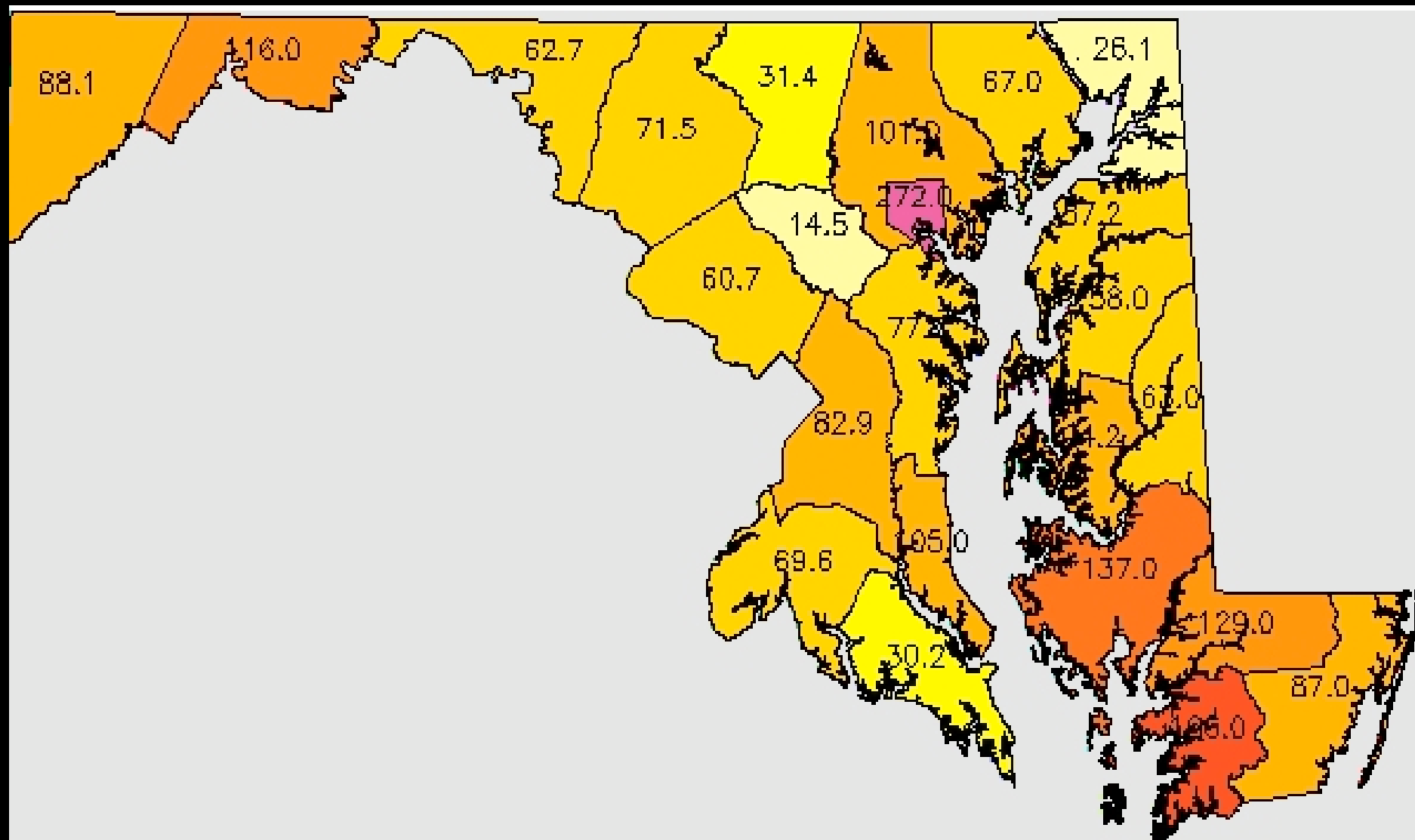
- Highest proportion of families headed by single parent
- Highest levels of poverty

Kimes et al., Health and Place, 2004



Example of Spatial Tools

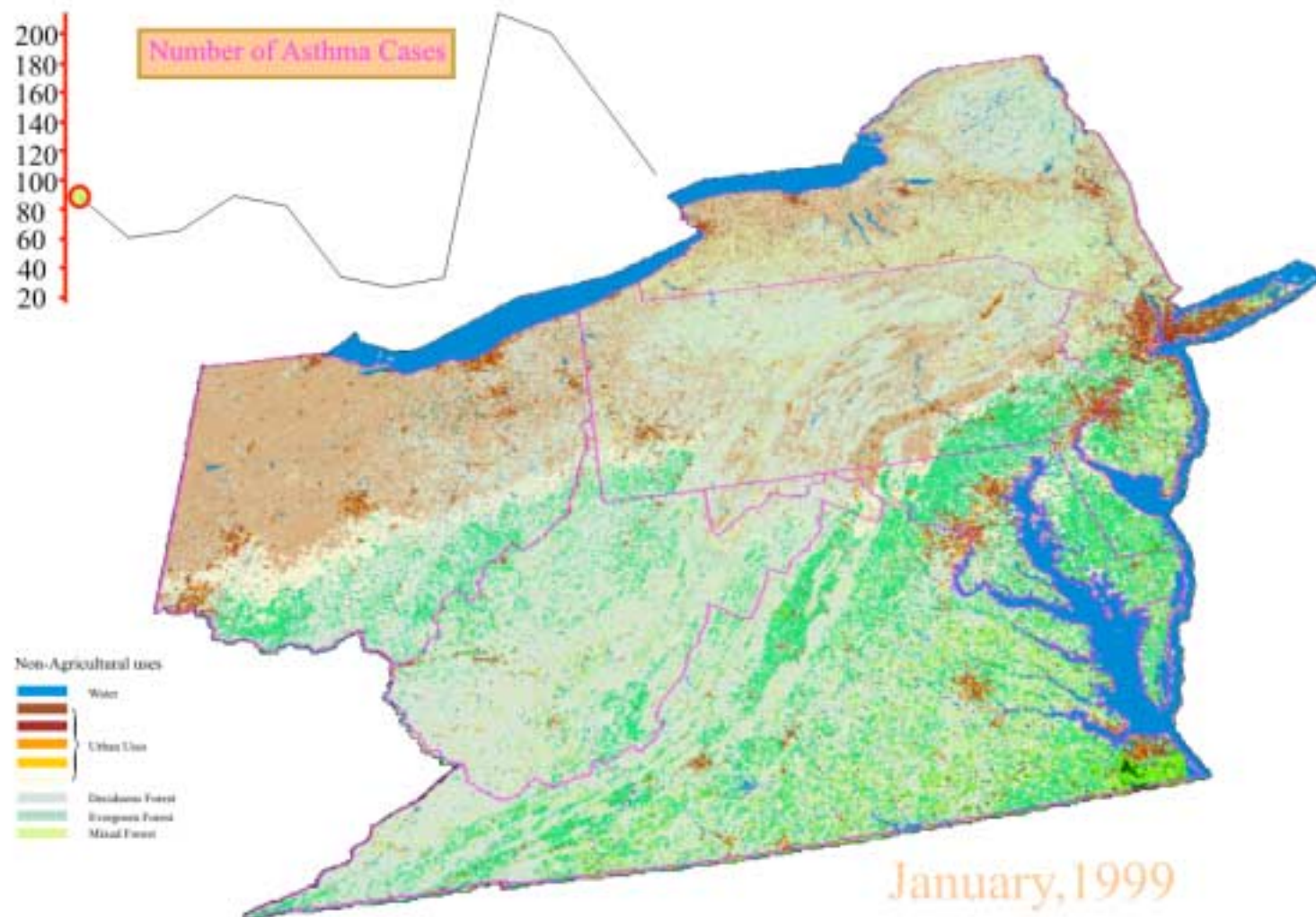
Pediatric Asthma ED Admissions/10,000, 1999, MD Counties





NDVI Change for Agricultural Areas

SPOT (Veg) Data, 1999, 10 day composite





Baltimore Student Sun Photometer Network (BSSN)



Aeronet Sun Photometer, Maryland Science Center,
Baltimore, Maryland





Summary

- A set of data analysis tools and capabilities have been built for:
 - Integration and analysis of clinical, remotely sensed, and environmental data
 - Decision support about asthma and other health issues at local, regional, and national scales
- Clear temporal and spatial trends of pediatric asthma hospitalizations have been identified which can be used to search for asthma triggers
- Accurate predictions of pediatric asthma can be made using remotely sensed, socioeconomic, and clinical data

